

## DESCRIPTION

OPTICAL ELEMENT, SEMICONDUCTOR DEVICE, AND  
OPTICAL INFORMATION RECORDING DEVICE  
EMPLOYING THE SAME

## TECHNICAL FIELD

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MDS  
7-27-05

THIS APPLICATION IS A 371 OF PCT/JP01/05822 07/04/2001

The present invention relates generally to an optical information processing device that performs the recording, reproduction, erasure, etc. of information with respect to an information recording medium such as an optical disk. The present invention particularly relates to an optical semiconductor device employed in an optical head device, which has a function of detecting reproduction signals and various kinds of servo signals, and to an optical element used therein.

## BACKGROUND ART

The following description will depict a configuration and principle of operation of a conventional optical semiconductor device used in an optical information processing device, which has a function of detecting reproduction signals and various kinds of servo signals, while referring to FIG. 10. A light beam emitted from a semiconductor laser element 101 as a light source is diffracted in a Y direction as viewed in the figure by a three-beam-generating diffraction grating element 102, so that a zeroth order light of the same becomes a main beam while the first order lights ( $\pm 1$ ) become sub beams. These three beams obtained by division are focused on an information recording medium 106 by an objective lens 105 and reflected by the information recording medium 106, and then enter a hologram element 103.

The hologram element 103 is a diffraction grating composed of gratings, each in a curved line form. A reflected light beam from the information recording medium 106 is divided by the hologram element 103, where the +1-order diffracted light 107A is subjected to a converging effect, while the -1-order diffracted light 107B is subjected to a diverging effect, and they are guided to photodetector elements 104A and 104B, respectively. The +1-order diffracted light 107A incident on the photodetector element 104A is focused before a light-receiving surface thereof, whereas the -1-order diffracted light 107B incident on the photodetector element 104B

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